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ABSTRACT

While special care is needed to adapt approaches and strategies to the instructional requirements of adult populations, the innovative learning experiences inspired by the NCTM Curriculum and Evaluation Standards for School Mathematics are examples of good pedagogy that integrate nicely into an androgogical learning environment. This paper presents an overview of a study designed to identify and examine key factors that influence Adult Basic Education (ABE) mathematics instruction in Massachusetts and to develop a detailed picture of the adult basic mathematics learning environment. Example profiles of adult mathematics learners and instructors, along with glimpses into ABE and ideal mathematics classrooms, are given. Tables comparing reality with NCTM and ABE standards, recommendations for mathematics instruction, and the Research into Adult Basic Education Mathematics Project generalized research framework are included. (MKR)

World Education

Exploring What Is:

An Examination of Mathematics Instruction in Adult Basic Education Learning Environments

Support Document for Part II of Presentation on
Adapting the Standards to Adult Learners: Exploring What Is and What Could Be
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Introduction

This paper has been prepared as a handout to complement the presentation at the Research Presession of the 1994 NCTM Annual Meeting[1]. Its purpose is to provide an overview of the research design and background and context for the interpretation of the findings shared during the portion of the presentation associated with the current state of mathematics instruction in Adult Basic Education (ABE) learning environments. The Research into Adult Basic Education Mathematics (RABEM) Project was funded by the US Department of Education through the Office of Educational Research and Improvement as a Field-Initiated Study. Funding covered a substantial amount of activities over the 18 month period from July 15, 1992 through January 15, 1994 and allowed for the exploration of a topic that had previously been unexplored within the adult basic education population. The following pages provide a brief description of the design and structure of the study and some selected descriptive composite images to serve as reflexive contextual references for the data presented.

Purpose of the Study: To identify and examine key factors that influence ABE mathematics instruction in Massachusetts and to develop a detailed "picture" of the adult basic math learning environment.

Base Questions:

- What are the current instructional strategies and approaches utilized in ABE math classes in Massachusetts?
- What assessment mechanisms are currently employed and to what degree do instructors and learners believe they accurately reflect learning?
- What are the backgrounds and attitudes towards mathematics of ABE instructors who teach math?
- What are learner perceptions and opinions on mathematics teaching and learning in ABE classes?
- What are the existing curricular and support materials for ABE math and to what degree do they influence instruction and/or reflect current recommendations for mathematics instruction?
- What is current practice and content of ABE mathematics and how does this relate to existing recommendations for mathematics instruction?

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[1] Copies of the presentation paper will be available through ERIC.

Summary of Design and Sampling Strategy

Data Collection Mechanism	Sources of Information	Sample Size	Number of Responses
Phase I: Quantitative Sample			
Questionnaire	ABE Programs (Administrators) ABE Math Instructors	320[2] (1400)	77 (24%) 141 (10%)
Review of Materials	Assessment/Intake forms, curricular materials, etc.	As collected from programs, observations, etc.	
Phase II: Qualitative Case Sample			
Observation	ABE Instructors and Learners interacting in math learning environments	15 (each observed 2 times)	30
Interviews (individual)	ABE Math Instructors	17	17
Interviews (focus group or individual)	Learners	13 groups of 1 to 10 learners each	49

General Methodological Approach:

A combination of survey and case study methodologies were be used to conduct the Research into ABE Mathematics. The initial phase of the study involved a survey by questionnaire and was directed at the entire population of instructors involved in ABE math instruction in Massachusetts. This data provided general background information on the ABE math environment. It was reviewed to determine patterns of responses and used to define criterion for selection of the case study sample.

A combination of taped, in-depth interviews with instructors and learners and

[2] All programs were sent questionnaires and asked to complete them, regardless of whether they offered math and, where they did, distribute different questionnaires to their instructors who taught math.

classroom observation was then used to assess current teaching practices, skills and attitudes towards mathematics among teachers of mathematics based in a variety of ABE programs throughout the Commonwealth of Massachusetts.

Final research questions were identified in consultation with individuals comprising a Local and National Research Design & Dissemination Networks. Through a series of meetings and correspondence, research questions were reviewed by technical advisors, a team of ABE Math Teachers from Massachusetts, and members of the National Adult Education Staff Development Consortium (of the American Association of Adult and Continuing Education) and modified to make them reflect both the NCTM standards and the realities of ABE teaching in Massachusetts (the home site of the research) and the nation.

The Researcher spent two to three days at each of the programs observing math classroom practices, examining curricula and materials, and talking with program administrators, instructors and learners. Visit One: classroom observations and interviews with instructors. Visit Two: additional classroom observation and an interview with individual learners or a group of learners. Visit Three: as needed.

Sampling Procedure

The research was carried out in the Commonwealth of Massachusetts, an appropriate choice by virtue of its diverse network of over 200 ABE providers including school departments, community-based organizations, community colleges, correctional institutions, workplace education programs, libraries, homeless shelters, and others. Massachusetts serves more than 40,000 adults annually. In phase one, all providers received questionnaires for program administrators and math instructors to complete. The second phase utilized information from the questionnaire responses to develop a sampling strategy that would provide a representative sample for qualitative study stratified to reflect key variables.

Data Analysis

To encourage non-leading, generative responses supportive of the baseline nature of the study, questions were often open-ended. Responses to questionnaires formed the basis of a coding key that was expanded with each subsequent instrument for questions linked through the generalized research framework. Coded responses were entered into a relational database (RBase 3.1) and initial descriptive and statistical analysis were carried out on questionnaire data. Interview data was coded and entered and further supplemented through selective transcription of interview tapes (highlighting detail and preserving the ethnographic quality or respondent 'voice').

Findings

Data is presented in both quantitative and qualitative forms. Questionnaire data provides a broader view of the larger institutional context while data from interviews and observations provide a qualitative base for understanding the more specific math-related analysis. Profiles of teachers describing their backgrounds and present instructional practice are built from information collected on their math training, experience and teaching practices. Learner opinions and observations of learning interactions in math instructional environments provide the basis for construction of 'picture windows' into adult math learning.

As findings from the RABEM Study are extensive and interrelated, there will be no attempt made in this handout to summarize them. Rather, individuals who are interested in the findings are invited to request a complete version of the report: "Exploring What Counts: The State of Adult Mathematical Literacy in Massachusetts" which will be available in early May.[3]

Conclusions

Adults are a distinct and discrete learning population who's differences as learners have been explored by many in the field of adult education. While many educators are of the opinion that androgogy (the art and science of adult education) is little more than good pedagogy, the differences in experience and orientation between adults and children remain. Added to this mix are the unsuccessful experiences that the adult learner had in school and their eroded self-confidence and anxiety over their abilities that have had years to become imbedded characteristics. The result is a population for which 'traditional' school-generated learning experiences are not the likely answer. Findings from this research indicate that, while special care will still be needed to adapt approaches and strategies to the instructional requirements of adult populations, the 'innovative' learning experiences inspired by the *Curriculum and Evaluation Standards for School Mathematics* (NCTM, 1989) are examples of good pedagogy that integrate nicely into an androgogical learning environment.

As there is little room to share the findings of this study, the final pages of this handout have been reserved for sharing some qualitative insights into the realm of Adult Basic Education (ABE). What follows are composite profiles of learners and instructors and a glimpse into four ABE mathematics classrooms. Hopefully, these will provide some 'after-the-fact' context to the study and its presentation in the conference setting. This is also followed by the generalized research framework which summarizes the key questions, information sources and provides an indication of the degree to which responses were triangulated.

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[3] See end of handout for information on how to obtain copies.

Who is learning math?

The learners in this study ranged in age from a 16 year old hispanic teen mother to a 70 year old veteran of World War II, a descriptive divergence that rather sums up the degree to which this group can be generalized. The composite profiles which follow were drawn from data analysis referencing specific gender and ethnicity clusters and offer a couple of quick glimpses of who learners might be. Basically, however, the richness and variety of individuals that exists in our communities seems well represented in the ABE math classroom.

Composite Profiles of Adult Math Learners

Sharon is 32 years old, she is American by birth and has lived in Massachusetts all her life. She has been coming to this adult education program for 6 1/2 months now so that she might become better able to deal with the demands of her daily life. She wants to set a good example for her kids and be able to help them more, not to mention feel better about herself. In the end, she hopes that she'll be able to get off welfare, because she really doesn't believe that relying on that check is the right way for a family to live. She last took math in 1980 when she was in 10th grade. Sharon had always been bad at math and had really hated it because it was frustrating and made her feel stupid. Math seems OK now, and she is not as afraid of it as she used to be and is now able to help her kids with their math now and again. Its only the confusing word problems that seem to trip her up these days.

Marta is 24 years old and a mother of 2. She is Hispanic American and first learned math in Spanish, as she was born in Puerto Rico. She joined this ABE class 4 months ago and is working towards her GED because she plans to get a job and knows that she will need to have the degree as well as the skills to be able to get the job and do it well. Her last math class was in 8th grade in 1981. She did poorly in math and really didn't like it at all. She's studying math now mostly because it is part of the whole program package and she's been told that its one of the things she'll need to pass on her GED. Still, she sees some use for it in her life and knows she will need it for work. Math no longer feels like a waste of time like it did when she was in school and, in fact, she even likes math now. There are lots of different things that still bug her about doing math, but now she sort of gets into solving problems. And, since she figured out multiplication, she feels very confident about her ability to do so.

John, a 40 year old African American, has been in this ABE program for a little over 5 months. He's decided to come back and study because he's tired of not knowing what is going on around him. He figures its about time to get a GED, even though he's managed to get around not having one for a while now. He is thinking that he may even go on and get some more training after this, or even go to college. His last formal math learning was in 1969 when he was in 10th grade. He didn't do all that well in math, especially in elementary grades, but there were a

few things he liked later on. Since then, working construction and road crews, he's picked up a few things (though he doesn't often recognize it as 'real math'). Now, in this class, he really likes math and feels like he is learning a lot, especially things he can use in his life and on the job. The only thing he doesn't like about math now is when he doesn't understand or can't remember something he's sure he learned before.

Who is teaching math?

A very large influence on the math learning environment is the individuals who are its primary driving force: the instructors. As an introduction to math instructors of adults Terry, a composite ABE math instructor, has been created and submitted for your contemplation.

A Composite Profile of The ABE Math Instructor

Terry is 41 years old and has been teaching part-time at this ABE Program for a little over 4 years now. She teaches a GED class and teaches math because it's part of the program package. Before coming to this program she taught 3rd grade for 3 years and also tutored a few young adults in basic math. She never really liked math very much and although she did OK in it, it was not her best subject. The last math she studied was in High School, where she took Algebra and Geometry. While Terry still doesn't enjoy math all that much herself, she truly enjoys making learning math a good experience for her learners and helping them to overcome their fears and gain confidence.

When she first became an ABE teacher there wasn't any training offered at her program for how to teach math to adults so Terry went to a couple of math workshops. One was at the Statewide Conference for ABE instructors (Network '91) and another sponsored by SABES on GED Priority Math. It was really helpful and made her feel like she had a clear way to approach math instruction with her students, and some good materials to use. Talking to other math instructors about their ideas and experiences was really inspiring and gave her the motivation she needed to make her class more interactive. Since then, however, there are so many demands at the program and the budget seems so tight that there has been neither time nor money to support more staff development. While she feels a bit isolated at times, at least she has time to prepare for class and some money to buy materials. She'd like to be able to meet with other math teachers again to share ideas, go for more training and get some additional materials and manipulatives to use in her classroom, but considers herself lucky to have the support that she does. She also believes that it would be good to use computers more, but the one her program has is old, she doesn't really know how to use it and, even if she did, how can one computer be of use in a class with 12 learners?

Terry hasn't really heard much about the NCTM standards, but would like to know more, because she feels that adults need a new approach to math that is more

useful in their daily lives and makes math more "relevant, essential and accessible". She recognizes that her teaching is influenced as much by awareness of new perspectives as it is by her day to day, trial and error experiences. She's a little skeptical about straying away from the GED books, or using a lot of manipulatives and games with her adult learners. Without more information and support it is unlikely that Terry will be changing her basic workbook-oriented approach to math instruction with her learners. It would be taking too great a chance with the precious little time her learners spend to focus on something that may not help them pass the GED exam.

Terry represents only one of the many different ABE instructors who grace the programs around the state. She is a composite of trends seen in the data collected from the 141 instructors who took the time to respond to the 11 page questionnaire distributed throughout the state. She is not, however, "the average ABE instructor" for it would appear that no such being exists. As diverse as the programs, the learners, and the general population of the state and nation, so is the ABE math instructor.

Glimpses into ABE Math Classrooms

Now that it is clear who populates these learning environments, it is time to venture into one and see what it looks like.

Six Learners are scattered around the classroom seated uncomfortably in desks claimed as their own. Their lack of comfort seems to stem from the memories of high school that the individual desk seating and classroom setting evoke for them. As a couple more learners enter, they find themselves seats that complete the pattern of distance they have formed in the seating matrix of the class. They begin class together with a review of the homework assignment from the previous night. The instructor encourages learners to come to the board and to share their answers with each other in pairs (some serious movement is required). A bit of board work and some questioning is followed by some time for learners to try things out on their own, while the instructor travels from learner to learner helping as called and needed. A brief discussion and a chance for one learner to explain her strategy to others is followed by a homework assignment and movement on to the next GED topic requiring attention in this time slot.

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Between 30-36 learners are crammed into the spaces they select around the classroom. Some, who feel more comfortable with each other (or joined the class when they had no choice), share tables for 4. Most of the hispanic, african american and caribbean learners skirt the edges of the room having secured the individual study carrels for themselves. The instructor's desk sits in the corner of what must be the front of the room. As learners work through their workbooks, discussions that rise above a whisper are quickly greeted with a "Shhhhhh..." from the front corner of the room. In the relative quiet of the room, learners finish pages in their workbook and bring completed sections to lay on a front table. The

instructor picks the next workbook in line up and calls the learner up for a 10-15 minute conference. The individual conference includes review of the work, discussion of problem areas and sharing of 'tricks' to make it through. Whether there is math or not, depends on the learner and where they are at. 'Bags of tricks', counseling and caring are available for each individual regardless of topic or level. A few learners who have passed some practice tests or are on a particular vocational track, may merit some time on the computer (to practice typing skills, writing, science, but not math). With a half hour for lunch, class ends as it began; learners having spent 6 hours of continuous, focused individual work, guided unwaveringly and directly towards the GED.

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Twelve learners settle in to spots around the large work table, they begin their 3 hours (and their week) together by sharing some math that they have noticed in their lives over the weekend. As each example is shared, the instructor draws additional information from the learners and uses it as a jumping off point to explore processes, patterns, relationships and algorithms that emerge from recipes, filling a gas tank, buying groceries, or making change at work. After an hour or so of such webbed and interactive sharing, they move on to the 'problem of the week'. They settle into new work team pairs while one learner monitors how the pairing is rotating so that their plan to keep their partners shifting regularly is maintained. The activity, movement and decisions involved in the team problem-solving and discussion makes one thankful for the large tables and the fact that there are no other groups nearby to complain about the productive racket emanating from the room. The fact that calculators, measuring tools, and manipulatives are easily within reach is balanced by the fact that there is very little room between tables and walls, so movement for both instructor and learners can be dicey. After sharing some joint solutions and different problem-solving strategies used for the problem of the week, learners move on to different analysis problems: class attendance, charting weather patterns, or reconsidering/ redesigning their gingerbread house constructions. Class ends with promises to continue in a couple of days and learners are encouraged to write some math problems to bring to class and share. Tomorrow the focus will be different, but for today and Thursday, the class has elected to spend their full, uninterrupted 3 hours exploring math (or as they might share: about 6 hours out of 15, 2/5ths of their studies or at least 40% of their time on math).

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Learners come and go, occasionally greeting each other as one breaks off from his shift for an hour of study time, while the other returns to the floor and his work. The arriving learner logs in on one of the 5 computers around the room and continues on with the software, drilling himself on the next level in the program. Another learner, working through a workbook, calls the instructor over to help explain something that isn't quite clear. She talks him through his understanding and returns to the on-going evaluation and assessment tasks that take up much of her time. The learners, comfortable with the pattern of their individual learning plans, continue through their tasks on their own, asking for help only as needed.

Each ABE math classroom is a unique and interesting place that varies in physical layout, instructional format, and strategies used. It is influenced by where it is, the math levels and learning goals of learners, the materials and curriculum in use and, most of all, by the teaching style of the instructor. Through the descriptions above, four glimpses of classroom settings were provided. Selected for inclusion in this preliminary view were classes set in a school, an employment training school setting, a community-based technical training school, and a factory.

Touring an Ideal Learning Environment for Math

When asked what kind of a learning environment they would create given full support and no financial limits, the mathematical learning environments created by learners and instructors were similar and different. The following takes the reader on a tour of these 'fantasy math classes'.

The Learners' Classroom: *As you enter the room you are struck with its openness. There is a feeling of comfort, security, and activity and an imaginative use of space. It is a pleasant temperature and the room is painted different colors and decorated with a math motif. There are wide open spaces and, off to the side, separate areas for individuals and pairs of people to get awa, from the distractions that might disturb their concentration. The painted areas help you to see where one place ends and the next begins. There is even a small lounge area where people can sit in comfortable chairs and have some coffee and snacks while they work on their math. Around the edges of the room are shelves and activity areas. A couple of computers sit at one area with directions for use posted clearly on the wall, and diskettes with math software in easily accessible cupboards. On the shelves are all varieties of math manipulatives. Things you can get your hands into and your head around. Things that help you make sense out of the numbers and word problems and match them up to the real world: rulers, money, clay, calculators, thermometers, beads, string, games, cards, blocks, pattern squares and more. There are also books and workbooks, organized so learners can clearly see which books go with which topics and choose what to work on next.*

Right now, the learners are just finishing off an activity, there are about eight of them working together at a big table in the center of the room. They seem to be tackling the problem in small groups of 4, with the instructor and assistant helping the group when asked. On the large blackboard is a brief explanation of the challenging task at hand. When the learners finish their group work, they go off to pursue some of their work alone. A few go off in pairs to work on a problem together. The others busy themselves at other activity areas (computer, manipulatives) or gathering some individual homework from the workbook library area.

The Instructors' Classroom: *This room has an airy yet organized feel to it. Large windows let in light yet seem to keep the outside noises at a comfortable distance. The room is large and has an interesting combination of tables in the main area: a*

large table towards one end with several smaller tables scattered around the other end. Around the walls are activity areas clearly marked with signs, colors and pictures. The floor is carpeted with muted but distinctive coloring and incorporates a series of regular patterns that transform themselves from squares to geometrical shapes reminding one of a painting by M.C. Escher and bringing to mind many possibilities for exploration. Much of the wall space on one end of the classroom is covered with charts and graphs, most of which appear to have been developed by the learners. One corner of the room seems to be a lab or a workshop with tools and materiais that could easily transform the space into a store, kitchen, shop or other real life work environment. On the opposite corner of the room is an area which speaks to the technological interests of the learners. An array of 5 computers are set up with screens that allow learners to access interesting software programs quickly and easily on their own. Calculators are also available, but are to be found with the learners other personal workbooks, notebooks, papers and materials in their personal storage space. Surrounding this personal storage area are shelves with all forms of math manipulatives, some purchased, some obviously prepared by instructors or learners. There is an area where instructors and learners can meet or individual work can be done and another corner where coffee and snacks are available and math videos can be watched from time to time.

Currently, the two instructors are working together with the 12 learners on several ongoing projects. Everyone moves comfortably around the room, finding what they need to work with. There seems to be a great deal of self-direction and control on the part of the learners and no one appear to be rushed for time. The entire morning is devoted to math and, with their child care needs and transportation catered for, learners are sure that they will see each other tomorrow and are able to concentrate on their math learning today.

As promised, the composite images shared above are meant to provide some level of insight into both the current state and future hopes for adult mathematical literacy. For those familiar with the NCTM Standards, the limitations as well as the possibilities are readily apparent. In the companion presentation, the picture of "what is" that has been shared here is further extended into the image of "what can be" through discussion of a project that explored the theoretical and practical adaptation of the NCTM *Curriculum and Evaluation Standards* to the adult learning environment.

To close this support piece the following two perspectives are provided. The first provides a snapshot image of the relationship between the Standards for mathematics instruction (both NCTM and ABE specific), the ideal and the reality of instruction in adult math classrooms. The second, the generalized research framework, concludes the paper by offering an overview of the scope and relative validity of the research.

Table 1: Comparing Recommendations for Math Instruction with Reality

NCTM Standards (adapted)	Taught [Instructors]	Taught [Learners]	Important [Learners]	ABE Standards
Problem Solving	Problem Solving	Communication	Communication	Problem Solving
Communication	Reasoning	Problem Solving	Whole Number Computation	Communication
Reasoning (Connections)	Fractions	Estimation	Estimation	Reasoning (Connections)
Estimation	Communication	Whole Number Computation	Fractions	Estimation
Number Systems & Number Theory	Decimals	Reasoning	Problem Solving	Numbers, Operations & Computation
Whole Number Computation	Whole Number Computation	Measurement	Reasoning	Patterns, Relationships & Functions
Fractions	Estimation	Decimals	Decimals	Algebra
Decimals	Measurement	Statistics & Probability	Measurement	Statistics & Probability
Patterns & Relationships	Patterns & Relationships	Algebra	Patterns & Relationships	Geometry & Spacial Sense
Algebra	Algebra	Patterns & Relationships	Statistics & Probability	Measurement
Statistics & Probability	Number Systems & Number Theory	Fractions	Algebra	
Geometry & Spacial Sense	Statistics & Probability	Geometry & Spacial Sense (Number Systems & Number Theory)	Geometry & Spacial Sense (Number Systems & Number Theory)	
Measurement				

RABEM GENERALIZED RESEARCH FRAMEWORK

Code /Ref #	FOCUS, CATEGORIES, Questions, and (- subtopics)	Source(s) of Information	Data Collection Strategy	Corresponding Questions on Instruments
I	**FOCUS ON MATH INSTRUCTION**			
I1	INSTRUCTIONAL APPROACH			
I1a	Which instructional methods, strategies or approaches are used to teach math in ABE classes? Questioning, Discussion, Memorization, Drilling, Lecture, Group Problem Solving, Prediction, Estimation, Writing (about math, for practice), Exploration and conjecture, use of instructional aids: technology (calculators, computers)/ manipulatives	Instructor Learner	Questionnaire Observation+ Interview (individual) Interview	IQ: 14 II: 8, 13 CO: 7 LI: 15, 16
I1b	Which methods of instruction are perceived to be most effective in supporting math learning?	Instructor Learner	Questionnaire Interview (individual)	IQ: 15 II: 9, 10 LI: 10, 12, 13
I1c	Does (and/or should) learner culture and background impact on selection of instructional strategies	Program Instructor Learner	Questionnaire Interview (individual) Observation	PQ: 6 IQ: 7 II: 19 a,b CO: 16 LI: 9a-c, 10
I2	What are the existing recommendations for mathematics instruction? (Content - Instructional strategy)	Documents (NCTM Standards, etc.)	Literature Review	LR
I4	ASSESSMENT			
I4a	What assessment strategies are used in ABE math classes? (type, frequency, etc.)	Program Instructor Learner	Questionnaire Interview Observation	PQ: 16 IQ: 13 II: (follow-up) 20a, 21 CO: 11 LI: 23a
I4b	What assessment instruments are used? (source: instructor designed, standardized tests, textbook, self-assessment, peer-assessment...)	Instructor Sample Instruments (tests, quizzes, checklists, etc) Learner	Questionnaire Interview Observation Document Review	PQ: 15, 16 IQ: 18 II: (follow-up) 20a, 21 CO: 12 LI: 24a-c

Code /Ref #	FOCUS, CATEGORIES, Questions, and (- subtopics)	Source(s) of Information	Data Collection Strategy	Corresponding Questions on Instruments
I4c	How are assessment results used?	Instructor Learner	Questionnaire Interview Observation	IQ: 19 II: (follow-up) 20b/c, 21 CO: 12, 23a
I4d	How well does the instructional program match the student(s) needs?	Instructor Learner	Interviews Observation Analysis	II: 21 a,b CO: 13
T	FOCUS ON INSTRUCTOR			
T1	MATHEMATICS BACKGROUND			
T1a	What mathematics education and training have ABE instructors received? (post-high school math training, college courses (credit and non-credit), degrees, etc.)	Instructor	Questionnaire	IQ: 21, 22 II: 6, (11)
T1b	What teaching experience have ABE math instructors had?	Instructor	Questionnaire	IQ: 20
T1c	What knowledge to instructors have of current trends in mathematics reform? (membership, organizations, NCTM standards)	Instructor	Questionnaire and/or Individual Interview	IQ: 23, 24 II: (follow-up) 33
T2	INSTRUCTOR VIEWS AND ATTITUDES			
T2a (L2a)	How do instructors define mathematics?	Instructor	Questionnaire Interview	(IQ: 5) II: 12
T2b	What are instructors personal opinions, interests or attitudes with respect to mathematics?	Instructor Learner	Interview Observation Individual/ Group Interview	II: 7, (11) CO: 14 LI: 11, 6
T2c	How confident are ABE math instructors in their math abilities/ (ability to teach math/to do math)	Instructor	Interview (Observation)	II: 7 a,b,c, 13, 31 CO: 15

Code /Ref #	FOCUS, CATEGORIES, Questions, and (- subtopics)	Source(s) of Information	Data Collection Strategy	Corresponding Questions on Instruments
P	**FOCUS ON PROGRAM**			
P1	What levels of mathematics and which instructional formats are utilized in ABE math instruction (ESL, ABE, ASE, FL, WE...)	Program Instructor	Observation Questionnaire Interview	PQ: 4, 5 IQ: 6, 8 II: 5, (8) CO: 8
P2	How much instructional time is devoted to mathematics in ABE programs?	Program Instructor Learner	Questionnaire Interviews Observation	PQ: 3, 12 IQ: 8 II: (follow-up) 22 a,b CO: 4 LI: 22a-c
P3	PARTICIPATION IN MATH INSTRUCTION			
P3a	How many instructors teach math?	Program	Questionnaire	PQ: 7
P3b	How many learners take math?	Program Instructor	Questionnaire	PQ: 12 IQ: 8
P4	How are math instructors selected? (criteria, procedures)	Program (Learner)	Questionnaire or Interview	PQ: 8 II: 6a (32) LI: 19
P5	How are learners selected to participate in math classes? (intake assessments, selection criteria, programmatic limitations)	Program Instructor Assessment Instruments	Questionnaire Document review and analysis	PQ: 15 IQ: 13
P6	INSTRUCTOR TRAINING AND SUPPORT			
P6a	How are math instructors trained?	Program Instructor	Questionnaire or Interview	PQ: 9 IQ: 25 II: (follow-up) 26
P6b	How much training do math instructors receive?	Program Instructor	Questionnaire or Interview	PQ: 10 IQ: 26 (II: 26)
P6c	What other support do math instructors receive from their programs?	Program Instructor	Questionnaire or Interview	PQ: 11 IQ: 27 II: (follow-up) 27
P6d	What types of support are most helpful/useful?	Instructor	Questionnaire Interview	IQ: 28 II: (follow-up) 27

Code /Ref #	FOCUS, CATEGORIES, Questions, and (- subtopics)	Source(s) of Information	Data Collection Strategy	Corresponding Questions on Instruments
P7	STRENGTHENING MATH PROGRAMS			
P7a	How could Math Programs be strengthened?	Program Instructor Learner	Questionnaire	PQ: 17 II: 15 LI: 18
P7b	How could support to Math Instructors be strengthened?	Instructor	Questionnaire	IQ: 29 II: 25, 27
L	**FOCUS ON LEARNER**			
L1	PAST EXPERIENCE WITH MATHEMATICS			
L1a	What were learners' past experiences with learning math?	Learner	Group and/or Individual Interview	LI: 6a
L1b (C1a)	What reasons do ABE learners give for wanting to learn math/participating in ABE math classes? What math topics or skills do learners want to learn? Why? (also see C1a)	Learner	Group and/or Individual Interview	II: 24 LI: 7a,b
L2	INTEREST IN MATHEMATICS			
L2a (T2a)	How do learners define math	Learner	Group and/or Individual Interview	LI: 14
L2b	How do learners feel about math?	Learner	Group and/or Individual Interview	II: 23 LI: 6b, 8a-c
L3	MATHEMATICS INSTRUCTION AND LEARNING			
L3a (I4a)	When do learners feel successful at math (i.e. What is their criteria for success)?	Learner (Instructor)	Interview Group Interview	(II: 23) LI: 23
L3b (P7a)	What aspects of the learning environment do learners most appreciate? What would they change?	Learner	Interview (individual) or Group Interview	LI: 18, 19

Code /Ref #	FOCUS, CATEGORIES, Questions, and (- subtopics)	Source(s) of Information	Data Collection Strategy	Corresponding Questions on Instruments
C	**FOCUS ON CURRICULUM, CONTENT AND SUPPORT MATERIALS**			
C1	CURRICULUM CONTENT			
C1a (L2a)	What math topics and skills are important for ABE adults to learn and why?	Instructors Learners Materials Documents (NCTM Standards)	Interview (individual)s Group Interviews Literature Review	IQ: 5 II: (follow-up) 28 LI: 20a
C1b	What math topics and skills are being taught and why?	Instructors Learners Materials Class Syllabus/ Lesson Plans	Observation Interview (individual) Document Review	IQ: 10 II: 16, 29 CO: 10 LI: 20b
C1c	Which mathematical topics, concepts and/or skills are easiest/most difficult to teach and learn? Why?	Instructor Learner	Questionnaire Interview	IQ: 11, 12 II: (follow-up) 18 LI: 21a,b
C1d	How do math content and skills covered in ABE classes relate to NCTM standards?	Documents (NCTM Standards)	Literature Review & Analysis	LR II: 16 LI: 20b
C2	MATERIALS			
C2a	What curricular and support materials are being used in ABE math classes? (types: print, concrete, technological)	Instructor Materials Learner	Questionnaire Observation Interview	PQ: 13, 14 IQ: 9, 16 (II: 9) CO: 9 LI: 17a-b
C2b	How are various materials used to support math learning? (instructional aids, in-class activities, homework, calculators, manipulatives, reference,...)	Instructor Learner Classroom	Observation Questionnaire Interview (individual)	(PQ: 14) (IQ: 16) (II: 9) CO: 9
C3	What materials are perceived to be most helpful in learning math?	Instructor Learner	Questionnaire Interview (individual)	IQ: 17 (II: 9) LI: 17c

Code /Ref #	FOCUS, CATEGORIES, Questions, and (- subtopics)	Source(s) of Information	Data Collection Strategy	Corresponding Questions on Instruments
B	**FOCUS ON BACKGROUND INFORMATION**			
B1	Who are we gathering information from? [Contact/Sorting Information (Name, Position, Program, Address, Phone, Class, etc.)]	Program Instructor (Learner)	Questionnaire Interview Observation	PQ: 1, 2 IQ: 1, 2, 3 II: 1, 2, 3, 4 CO: 1, 2, 3 LI: 1, 2
B2	How long have they been associated with the program?	Instructor Learner	Questionnaire Interview	IQ: 4 LI: 3, (4, 5)

A complete version of the report: "Exploring What Counts: The State of Adult Mathematical Literacy in Massachusetts" will be available in early May. Copies can be obtained by sending $10.00 (payable to World Education) and your request to Bonnie Mullinix or John Comings, World Education, 210 Lincoln Street, Boston, MA 02111.